

NOTE TO FILE

SUBJECT: Meeting with Michael Ware, Gray Bowditch, and Matthew Roth, offices of Jones Blechman, December 21, 2009.

I had the opportunity to speak with Mr. Roth. I was also given written reports from Mr. Pulliam, Soils Engineer, Michael Galli of ECS Mid-Atlantic, LLC, and his environmental scientist, Mark Romulus.

Mr. Roth indicated that the County's preference for two tracks of eco-stone with soil between them would actually threaten to create a trough through which water would wash into the bay, possibly causing erosion of soils in the trough. Moreover, his concern was that if the pathway were constructed too narrowly, the wheels of a golf cart might more easily fall off the edge of the pavement on either side, causing gouges in the soil and further erosion possibilities. He said that the path construction he has proposed, with six inches of compacted aggregate underneath the interlocking blocks, would act as an infiltration trench and actually could prove to be more absorbent of stormwater than the soil in its natural condition. It would be less destructive of the bay, he said, than a mulch path, because mulch is loose material which has a tendency to wash into the bay, even after it has been compacted for several years and has begun to disintegrate.

He noted that Cape Charles on the Eastern Shore has allowed pavers as part of the Bay Creek Marina in lieu of a retention pond, so impressed was the Cape Charles staff with the stormwater control capacities of eco-stone.

Mr. Roth indicated that he had spoken with Scott Ray in Gloucester County, and Mike Woolson in James City County (both of them being Anna Drake's counterparts in those localities) and both indicated that, with proper engineering back-up, they would be "warm to" an application for an eco-stone pathway inside the RPA.

Mr. Roth noted that the soils engineer had found that, constructed as proposed, the eco-stone path would have one-half inch per hour infiltration during a storm event, which would be even better than mulch. Moreover, the eco-stone would not further compact, unlike the natural soil if Mr. Pulliman's disabled father were to drive his golf cart over the unprotected ground in order to get to the pier.

Mr. Roth indicated that, in addition to the plans he was showing for the construction of the pathway, filter cloth could be inserted between the paver stones and the aggregate beneath. The result might actually help to keep the voids between the stones free of accumulated grit, as water pooling up in the voids might have a tendency to lift grit and other debris out of the void and allow it to

wash over the pathway rather than clogging up the voids and rendering them impervious to water.

Speaking with Mr. Ware, it was noted that Mr. Pulliam was perfectly able, if he wished, to submit a new application to the Chesapeake Bay Board rather than following through with his appeal. However, absent an agreement to remand the case to the Chesapeake Bay Board, his inclination is to follow through with the appeal. I indicated to Mr. Ware that I thought that the idea of consensual remand had merit, and I would propose it to the Chesapeake Bay Board. The meeting ended on that note.

October 27, 2008

Mr. Mike B. Ware, Esquire
Jones, Blechman, Woltz, & Kelly. P.C.
701 Town Center Drive, Suite 800
Newport News, VA 23612-2888

Re: Pulliam York County RPA Encroachment Exception Case #08-114

Dear Mr. Ware:

Patton Harris Rust & Associates (PHR+A) has been retained by Mr. Norman Pulliam of 108 Anchor Lane in Yorktown, Virginia to prepare this written correspondence in support of his exception case (i.e. 08-114) with the York County Wetlands Board. PHR+A understands his request for an exception was turned down by the board on June 4, 2008.

Prior to preparing this correspondence, PHR+A has reviewed minutes from previous board meetings, the ECS geotechnical engineering report dated September 26, 2008, specifications received from the EcoStone Pavers manufacturer, and County and State environmental regulations. In addition, PHR+A has evaluated conditions on the Pulliam property including site drainage pattern, existing soil materials, and the County's claim that 17.4 % of the property is impervious.

PHR+A's presentation including a review of the proposed project, technical data evaluation, and future recommendations follow:

I. Proposed Project Summary

A. Historical Review

Minutes from York County Chesapeake Bay Board (i.e. Wetlands Board) public hearings held on May 8 and June 4, 2008 reveal York County Department of Environmental Services (ED&S) was to consider Mr. Pulliam's request for installing a 4.5-foot wide residential pedestrian pathway within a designated Resource Protection Area (RPA). After some initial reservations, County staff expressed willingness to allow a three (3)-foot wide "EcoStone Paver" path from the back of the Pulliam residence over an area of approximately 405 square feet to a pier situated on Boathouse Creek (See attached plat). County staff, however, was not supportive of the wider path.

Initially, ED&S expressed concerns regarding the allowance of infiltration trenches in RPAs, and in the use of pervious paving materials in pathway

construction, specifically for the disabled. ED&S cited safety concerns and ineffective performance. However, following the April 2008 public hearing, the County was willing to work with Mr. Pulliam and grant him some latitude on his project. Guidance from the Chesapeake Bay Local Assistance Department Riparian Buffers Modification Manual suggests paths should be only two (2) foot in width with native vegetation and/or mulch to be used to cover exposed soil. Staff further recommended utilizing the three-feet as two 18-inch paths with a two-foot separation in between. The County indicated the two (2) options could be administratively approved.

Secondly, ED&S believes the Pulliam lot is over 16% impervious. The minutes state the lot is approximately 17.4%, but do not indicate how they came up with the impervious cover estimate. Thus, because the impervious area exceeds 16%, the mitigation required to offset the impact is "doubled." The type of mitigation necessary to offset the pathway construction would entail buffer restoration plantings.

Finally, the Wetlands Board voted to decline the exception request for a 4.5-foot pathway unanimously. Judging from the outcome, it appears the County is not familiar enough with either how well the product works, nor how it performs long-term. The ruling suggests both the Wetlands Board is not comfortable approving a more extensive project without have a previously established precedence.

B. Review Response

PHR+A has determined the actual area of the proposed pathway to be 450 square-feet instead of the 405 square-feet previously stated. This will allow for more permeable area and increase the filtering of suspended solids. Thus, extending the proposed pathway to 4.5 feet should not adversely impact the existing RPA. Moreover, through the use of interlocking pavement, open-graded rapid draining crushed stone, a variety of aggregate materials, and a proportionately large number of fines less than 3 percent, Uni-Group, U.S.A.. (manufacturer) does not consider the EcoStone paver to function like an infiltration trench, but more like a structural BMP. As a result, water flow is slowed significantly allowing for oxidation, suspended solids are filtered, and water temperature is effectively reduced. Based on the manufacturer's assessment of this, PHR+A considers Mr. Pulliam's proposed paver system to act more like a bio-retention facility reducing volume and peak flows, capturing the "first flush," and successfully removing total suspended solids (TSS).

County meeting minutes state an estimated 17.4% (or 0.24-acre) of the 1.391-acre site is impervious. Based on this assumption, a 3 foot pathway would create a total impervious area of 0.251 acres or 18.01%. Widening the pathway width to a total of 4.5 feet, would only increase the total impervious cover to 18.33% (a total of 0.93% greater than the original 17.4% estimate. Please note that the figures listed above consider the proposed pathway surface material to be 100% impervious. The crucial point to note regarding this comparison is that the increase between a 3-foot and 4.5-foot wide pathway only results in a 0.32% increase in paver area over the entire site. Conversely, PHR+A estimates the overall amount of

impervious cover on the property to be closer to 13.8% if we consider the gravel driveway to be 50% impervious. PHR+A staff utilized a digital scan of Mr. Pulliam's plat and traced two individual digital areas around all of the impervious surfaces on his lot, resulting in an exact square footage of 3,362 square-feet of gravel driveway and 6,740 square-feet of building/concrete area. With PHR+A's impervious cover estimate being below 16% (the impervious percentage is still only 15.3% by adding in an assumed impervious 4.5 foot wide pathway area), the need for "double" mitigation is eliminated. In the worst case, PHR+A asserts that installation of the paver pathway would only have a negligible effect on water quality for runoff from Mr. Pulliam's property entering Boathouse Creek.

Judging from the June 4th response, it is apparent the Wetlands Board relies heavily on ED&S staff recommendations. With the added pressure to protect the Chesapeake Bay and its tributaries, board members often have to fall back to more predictable and reliable methods and practices. ED&S empathized that Mr. Pulliam proposal is the first paver request to come before the Wetlands Board. As a result, the Wetlands Board is concerned about setting a "precedence" of approving a proposal without adequate performance data.

Uni-Group, U.S.A. has provided historical performance data on the EcoStone pavers system. This information can be presented to the Wetlands Board regarding this product.

II. Technical Data Evaluation

A. Manufacturer Data and Case Study Review

Permeable interlocking concrete pavement (PICP) systems have been in existence for nearly thirty-five (35) years. According to available manufacturers studies, presently there are nearly 150 systems already operational nationwide, including two (2) recently installed in Hampton Roads. Extensive long-term monitoring indicates these systems have performed well in nearly every region of the United States. Many larger developments utilizing PICP's have been EPA-mandated, thus requiring long-term monitoring.

EcoStone pavers can be applied for a wide variety of uses including pathways. PICP's should not exceed 5% slope for maximum infiltration. The minimum estimated depth from the bottom of the pavement base to the high level of the water table should be greater than two (2) feet to allow for filtration of pollutants.

PICP's are designed to infiltrate frequent, short duration storms. This constitutes approximately 85% of all storm events in the United States. Manufacturers specifications suggest PICP can manage a 100-year storm event. In addition, several independent studies as well as manufacturer's specifications indicate that infiltration rates for PICP are much higher than those for a natural forest cover or even pasture. Research indicates only non-compacted sandy soil and dry clay have higher infiltration rates. Compared to soils, materials used in EcoStone pavers have very high infiltration rates ranging from 500 in/hr to over 2000 in/hr. Although infiltration rates are high, the manufacturer indicates the importance of considering lifetime infiltration of the entire paver cross section will in the design

process. A conservative rate of 3 in/hr should be used as the basis for the design surface infiltration rate over a 20-year pavement life. The manufacturer studies do indicate lifetime infiltration rates are difficult to predict. The most long-term study indicates that a newly installed paver system with an approximate 12% open surface area and a 2-5 mm drainage void fill aggregate infiltrated at a rate of 62 in/hr. After 10 years, the infiltration rate decreased to 16 in/hr. The manufacturer and their support studies state that engineers should account for maintenance and employ conservative design criteria when designing PICP's to ensure optimal long-term performance.

EcoStone pavers can be designed with either full, partial, or no exfiltration into the subgrade. Manufacturer's specifications indicate optimal installation is achieved by infiltration through base aggregate with complete exfiltration into a permeable subgrade. This will allow for runoff, pollutant reduction and groundwater recharge. While effective operation requires greater initial site evaluation, a well conceived design combined with construction skill, inspection expertise, and general attention to detail leads to better system performance. In addition, maintenance is an important design aspect in ensuring effective long-term performance. Cleaning with sweeper or vacuum equipment is essential, as is annual inspection and timely aggregate replacement.

B. ECS Site Geotechnical Study Review

ECS Mid-Atlantic, LLC conducted an onsite evaluation of the Pulliam property in September, 2008. ECS bored the location where the proposed pathway is to be installed. Results from the two (2) borings indicated that three (3) basic soil strata: Soil types I, II, and III occur onsite from just below the surface to six (6) feet down. The borings did however indicate variation from one boring to the other. It appears that further down-slope Soil type I soils are more prevalent to a greater depth (i.e. 4-5 feet). Soil type I according to USDA textural classification is a Silty Sand (SM) with an estimated infiltration rate of between 1.02 to 0.52 in/hr. (or greater). This particular classification is noted as Hydrologic Soil Grouping B. According to USDA, typically soils with Hydrologic Soil Group designations of either A or B are considered suitable for infiltration purposes.

ECS concluded that based upon published data and regional conditions, the geotechnical engineer believes the PICP could handle up to 100% of the stormwater runoff for most of the region storm events. ECS further stated that by widened the pathway to 4.5 feet, this would increase storage capacity by approximately 1.6 square feet thus creating a system that potentially could handled more runoff if needed.

ECS stated in its final conclusion that the proposed PICP would do no less than improve drainage characteristics on the Pulliam property in addition to minimizing impacts associated with stormwater runoff.

III. Recommendations

- The Wetlands Board has an opportunity to reconsider Mr. Pulliam's exception case and possibly reverse their June 4th ruling.

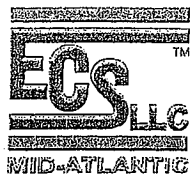
- Based on the manufacturer's specifications and the case studies noted, optimization of the PICP on the Pulliam site can be achieved through a conservative engineering design by a qualified engineer familiar with local conditions, a well executed installation, effective long-term maintenance, and quality inspections by a certified contractor.
- Some exfiltration will need to be considered. Perhaps Mr. Pulliam's idea for an additional BMP onsite may be warranted as a conservative approach.
- Mr. Pulliam will need to consider hiring a qualified, certified local engineer to design his PICP.
- Careful installation by a certified contractor is critical to the long-term performance of the PICP. Mr. Pulliam will either need to hire this contractor or become certified by the manufacturer.
- Additional mitigation offered by Mr. Pulliam would help enhance his case with the County. This might offset their reluctance to approve the additional pathway width.
- Long-term maintenance is critical to overall success. The manufacturer has a long-term maintenance program. This should be part of the mitigation package.

This concludes PHR&A's evaluation of the above-mentioned project. If you require any further information, data, or technical support, please feel free to contact us at 757.599.1050. We would welcome the opportunity to assist if necessary.

Respectfully Submitted,
PATTON HARRIS RUST + ASSOCIATES
A Professional Corporation

Mark S. Romulus, CE
Senior Environmental Scientist

Cc: Mr. and Mrs. Norman Pulliam
PHR&A file



ECS MID-ATLANTIC, LLC

"Setting the Standard for Service"

Geotechnical • Construction Materials • Environmental • Facilities

September 26, 2008

Mr. Norman Pulliam
Concrete Concepts
P.O. Box 14256
Newport News, Virginia 23608

ECS Project No. 07:9959

Reference: Subsurface Exploration and Infiltration Study
Pulliam Residence
108 Anchor Lane
Yorktown, Virginia

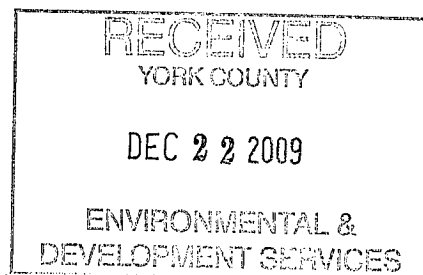
Dear Mr. Pulliam:

ECS Mid-Atlantic, LLC has completed a subsurface exploration and engineering evaluation of the above referenced project. This report presents the results of the subsurface exploration and engineering analysis for the proposed project.

Introduction:

The project is located at the rear of the property and will consist of the construction of a new pathway extending from about the rear of the existing residence down to a waters edge. The path is expected to be 4.5 ft wide and will be constructed of the Uni Eco-Stone permeable pavers. We have been requested to provide a subsurface exploration and geotechnical engineering analysis for the soils encountered within these areas with respect to infiltration and the proposed improvements. The project site was generally grass covered and moderately sloped to the rear of the property.

The purpose of this exploration was to explore the soil and groundwater conditions at the site and to develop soils-related engineering recommendations to guide design and construction of the planned development. Our investigation included extending two (2) hand auger borings to explore the subsurface soil and groundwater conditions, performing a site reconnaissance to observe general topography, and analyzing field data to develop appropriate geotechnical engineering recommendations regarding the planned construction.



Subsurface Conditions:

The subsurface soils were explored by performing two (2) hand augers to depths of 5 to 6 ft below existing site grades (bgs) within the path alignment. The hand auger locations were selected and located by ECS personnel.

Our subsurface exploration and site reconnaissance determined that below surficial topsoil, we encountered mixed deposits of medium dense consistency Silty and Clayey SAND (SM and SC) that extended to the depths explored at 5 to 6 ft below site grades. Interbedded within these coarse-grained layers, we encountered medium stiff consistency Sandy Fat CLAY (CH) in HA-1 and HA-2 at depths of 3 to 5 ft, and 2.5 to 4 ft and 5 to 6 ft, respectively.

Groundwater was not encountered at the boring locations. Please note that groundwater levels are influenced by seasonal conditions and by periods of significant precipitation or prolonged drought.

Infiltration Testing:

The following table summarizes estimated infiltration rates based on the USDA textural classification. Three (3) basic soil strata were encountered at the boring locations:

- *Soil Type I:* Silty Sand (SM) – Estimated Infiltration rate is 1.02 to 0.52 inches per hour (or greater), Hydrologic Soil Grouping B.
- *Soil Type II:* Clayey Sand (SC) – Estimated Infiltration rate is 0.52 to 0.02 inches per hour, Hydrologic Soil Grouping B to C.
- *Soil type III:* Sandy Clay (CL and CH) - Estimated Infiltration rate is 0.02 inches per hour (or less), Hydrologic Soil Grouping D

Boring Location	Soil type I depth (feet)	Soil type II Depth (feet)	Soil type III Depth (feet)	Water Table Depth (feet)
HA-1	0-1.5	1.5-3	3-5	-
HA-2	4-5	0-1.5	2.5-4, 5-6	-

Notes: - Not encountered

Typically, soils with the Hydrologic Soil Group designations of A and B are considered suitable for infiltration purposes. Some soils designated as C type soils are considered suitable for infiltration practices but these soils would need to be evaluated on a case specific basis. Soils with group designations of D are not considered suitable.

Conclusions:

We understand the site is proposed to be improved by installing Uni Eco-Stone permeable pavers to construct a new walkway path. In order to install the paving system, the soils will be removed to a depth of about 18 inches beneath existing site grades. The pavers are then supported on a layered stone base consisting of about 8 to 10 inches of ballast stone placed on a geotextile fabric and 2 to 3 inches of No. 78 stone or a suitable free-draining coarse aggregate. The pavers are then installed and rock dust or a coarse-grained free draining sand is utilized to fill in the voids. Typically permeable pavers are utilized in design assuming the system has an infiltration rate of 3 inches per hour. However, based on published data for this product, much higher infiltration values are being observed. Additionally, the stone base layers have a much higher infiltration value of about 15 to 20 inches per hour. Accordingly, these infiltration rates are much higher than the natural soils, thus reduces the potential for storm water runoff.

Additionally, permeable pavers are designed to reduce or minimize storm water run off by creating storage areas or reservoirs which allows for an increased capacity of handling storm water runoff. Based on published data and regional conditions, we believe this system could handle up to 100% of the storm water run off for most of the regions storm events. Additionally, we understand the project was approved for a 3 ft wide path and it is proposed to widen the path to 4.5 ft. This increases the storage capacity by about 1.6 square feet and creates a system that could handle even more run off if needed.

Therefore, we believe the permeable pavers will do no less than improve the drainage characteristics of the area, in addition to minimizing impacts due to storm water runoff.

Construction Considerations:

The subgrade materials are moisture sensitive and exposure to the environment may weaken the soils at the bearing level if the excavations remain open for too long a time. Therefore, compacted structural fill should be placed the same day that the soils are excavated. If the bearing soils are softened by surface water intrusion or exposure, the softened soils must be removed from the excavation bottom immediately prior to placement of the next lift.

In a dry and undisturbed state, the soil at the site will provide good subgrade support for fill placement and construction operations. However, when wet, this soil will degrade quickly with disturbance from contractor operations. Good site drainage should be maintained during earthwork operations which would help maintain the integrity of the soil.

General Comments:

This report has been prepared in order to aid in the evaluation of this site and to assist the Contractor, Architect, and Engineer in the design and planning of the project. The report scope is

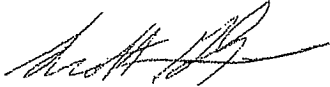
*Proposed AAA Regional Office Building
J. Clyde Morris Boulevard
Newport News, Virginia
ECS Project No. 04:4933
Page 4*

limited to the specific project and location described, and the project description represents our understanding of the significant aspects relevant to soil and foundation characteristics.

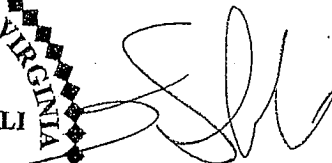
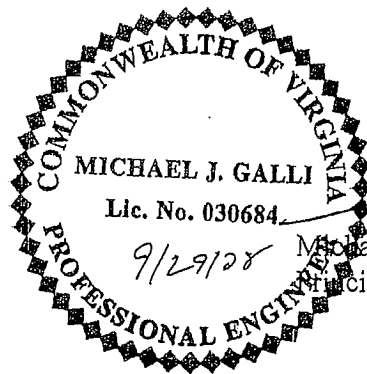
We have appreciated being of service to you during the design phase of this project and look forward to its successful construction. If you should have any questions regarding the information and recommendations contained in this report or if we can be of any further assistance, please contact our office.

Respectfully,

ECS Mid-Atlantic, LLC.



Scott Gresham, P.E.
Construction Services Manager



Michael J. Galli, P. E.
Principal Engineer

DJG/MJG

Attachment: - Hand Auger Logs



HAND AUGER BORING LOGS

ECS PROJECT #: 07: 9959

LOT: 108 ANCHOR ROAD
COUNTY, STATE: YORKTOWN, VIRGINIA

DEPTH (inches)	LOCATION: HA-1
	DESCRIPTION OF MATERIALS
0-18	Fine to Medium Silty SAND (SM), with Clay pockets, Dark Gray, Moist
18-36	Fine to Medium Clayey SAND (SC), Brown, Moist
36-60	Fine Sandy Fat CLAY (CH), Brown-Gray, Moist
	GROUNDWATER NOT ENCOUNTERED
	END OF BORING AT 72 INCHES

DEPTH (inches)	LOCATION: HA-2
	DESCRIPTION OF MATERIALS
0-12	Fine to Medium Silty SAND (SM), with Clay pockets, Brown, Moist
12-30	Fine Sandy Fat CLAY (CH), Brown-Gray, Moist
30-48	Fine to Medium Silty SAND (SM), Gray-Brown, Moist
48-72	Fine Sandy Fat CLAY (CH), Brown, Moist
	GROUNDWATER NOT ENCOUNTERED
	END OF BORING AT 72 INCHES

Note: Soils were classified in general accordance with ASTM D-2488
(Description and Identification of Soils - Visual/Manual Procedures)